



Automated Radioxenon Sampler/Analyzer

Ultra-Sensitive, Near Real-Time, Unattended Operation

- Automatically transmits γ -ray spectra and radionuclide concentrations to appropriate designated organizations.



Automated Radioxenon Sampler Analyzer
with outer panels removed for display

DESCRIPTION

The Automated Radioxenon Sampler/Analyzer (ARSA) is a fully automated, remotely programmable unit for ultrasensitive analysis of Xe-133 (5.2-day half-life), Xe-133m (2.2-day half-life), Xe-131m (11.9-day half-life) and Xe-135 (9.1-hour half-life) in near real-time, which permits high-sensitivity, remote detection of nuclear detonations. The ARSA fills the Comprehensive Test Ban Treaty (CTBT) requirement for near-real-time ultra-sensitive field measurement of short-lived noble gases. The ARSA filters air through a molecular sieve /aluminum oxide bed for removal of moisture, carbon dioxide, and acid gases and then through a charcoal sorption bed held at -100°C for xenon collection. The xenon is then thermally desorbed, purified and measured by β -coincidence γ -ray spectrometry. The gamma-ray spectra and radionuclide concentrations are automatically transmitted to appropriate organizations. The gas samples can be retained for laboratory confirmatory analysis if required.

SPECIFICATIONS

- Continuously separates xenon from the atmosphere at a flow rate of 40 m^3 per 8-hour collection period.
- Measures the Xe-133 and Xe-135 with a sensitivity of about $100\text{ }\mu\text{Bq/m}^3$ during a subsequent 16-hr period. (Four samples measured simultaneously).

- Reports abnormally high concentrations of radioxenon as soon as statistically valid data have accumulated.
- Low maintenance components; semi-annual restocking.
- The $0.9 \times 2.1 \times 2.1\text{ m}$ unit is designed to be housed in an appropriately sited environmentally controlled space.



- Operates automatically and all functions are remotely programmable.

ADVANTAGES OF AUTOMATED NEAR REAL-TIME ANALYSIS

- Makes continuous measurements without assistance by operators.
- Eliminates delays between sample collection and analysis.
- Allows the measurement of the 9-hour Xe-135 before significant decay to permit differentiation between nuclear detonation debris and reactor releases.
- Provides cost savings by eliminating time consuming sample transport and routine laboratory analyses.

DEVELOPMENT SEQUENCE

April through September 1997 field tests of the Automated Radioxenon Sampler/Analyzer will be followed by selection of a manufacturer and commercial production.